

REMARKS

Reconsideration of the pending application is respectfully requested on the basis of the following particulars.

1. Drawings

Indication of acceptance of the drawings as originally filed is respectfully requested in the next Office communication.

2. In the specification

The specification is amended, as shown in the foregoing AMENDMENT TO THE SPECIFICATION, to correct minor informalities related to reference numerals. It is respectfully submitted that no new matter is added, as the changes simply correct minor informalities.

Entry of the AMENDMENT TO THE SPECIFICATION is respectfully requested in the next Office communication.

3. In the claims

As shown in the foregoing LIST OF CURRENT CLAIMS, the claims have been amended to more clearly point out the subject matter for which protection is sought.

New dependent claims 29 and 30 are added to further recite structure of a bypass and an adjustable valve included in the compressor installation. It is respectfully submitted that no new matter is added, since support for the new dependent claims may be found, for example, at least in Fig. 7 of the pending application and, for example, at least on page 10, line 22 through page 11, line 7 of the accompanying description in the specification as originally filed.

Claims 18, 24, 26, and 28 are amended to correct minor informalities. It is respectfully submitted that no new matter is added since the changes merely correct minor informalities.

Claims 15-17, 19-23, 25, and 27 are left unchanged and claims 1-14 remain canceled.

Entry of the LIST OF CURRENT CLAIMS is respectfully requested in the next Office communication.

4. Rejection of claims 15-17, 20, 22, 24-26, and 28 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 5,755,855 (*Baker et al.*) in view of U.S. patent no. 3,225,517 (*Wachsmuth*)

Reconsideration of this rejection is respectfully requested on the basis that the rejection fails to establish a *prima facie* case of obviousness with respect to claims 15 and 24, from which the remaining claims respectively depend.

Claims 15 and 24 recite a method and device for using recuperating heat of a compressor to reheat a cooled compressed gas mixture prior to sending the compressed gas mixture to a membrane separator.

Turning to the *Baker* patent, a process and apparatus for using three separation steps (condensation, flash evaporation, and membrane separation) are disclosed (abstract; col. 1, lines 44-46). In particular reference to Fig. 6 and the description in col. 24, lines 10-47, the apparatus includes a compressor 620, a chiller 621, a heater 622, and a membrane separator 623. A mixture of gas (equal amounts air and vinyl chloride) at raw stream 610 is at 25 psia and 25° C. The raw stream is mixed with the flashed gas stream 619 at 25 psia and is fed to the compressor as inlet stream 611 and exits the compressor as compressed stream 612.

The compressed stream 612 (including recirculated stream 615) is cooled to 5° C in chiller 621 which produces uncondensed stream 613 having 14 mol % vinyl chloride. In order to avoid condensation of the vinyl chloride in the membrane modules, the uncondensed stream 613 must be heated. In order to accomplish this heating, a heater 622 is positioned between the chiller and the membrane unit, and heated stream 614 thus passes to the membrane unit.

The Office action on page 3 acknowledges that the *Baker* patent fails to disclose using recuperating heat of a compressor to reheat a cooled compressed gas mixture prior to sending the compressed gas mixture to a membrane separator.

To cure this deficiency of the *Baker* patent, the Office action turns to the *Wachsmuth* patent. The *Wachsmuth* patent discloses a gas drying method and device in Fig. 2 that includes a compressor 25 connected to a fluid line 26 that is connected to a first passageway 27 in a first heat exchanger E-1. A water separator 28 is connected between the first passageway 27 and a first passageway 29 in a second heat exchanger E-2. The first passageway 29 is further connected to a passageway 30 in a third heat exchanger E-3, which passageway is cooled by interaction with a second passageway 56 that is in communication with a refrigeration unit 54.

The passageway 30 is further connected to a water separator 32 before continuing to second passageway 33 in the second heat exchanger E-2, and further to the second passageway 34 in the first heat exchanger E-1.

By this configuration, the cooled compressed air in the passageway 33 absorbs some of the heat of the compressed air in the passageway 29, and subsequently absorbs some of the heat from the compressed air in the passageway 27 into the air in passageway 34 before exiting therefrom (col. 4, lines 45-59).

It will be recognized by the laws of thermodynamics and the relations of heat transfer that the air in passageway 34 will only ever be heated to a fraction of the temperature of the compressed air in the passageway 27.

The Office action on page 4 suggests that it would be obvious to remove the heater 622 of the *Baker* patent and simply run the uncondensed stream 613 along, and indirect contact with, the compressed stream 612 in order to transfer heat from the compressed stream 612 to the chilled uncondensed stream 613, in a manner similar to that disclosed by the configuration described in the *Wachsmuth* patent.

However, it is respectfully submitted that the Office action has not met the necessary burden to establish a *prima facie* case of obviousness with respect to claims 15 and 24.

In particular, it is respectfully submitted that the Office action has not sufficiently established that a person having ordinary skill in the art would have replaced the heater 622 of the *Baker* patent with a heat exchanger of the type

disclosed in the *Wachsmuth* patent, since it does not appear that such a combination would have a reasonable expectation of success.

As noted above, in order to prevent the vinyl chloride in the uncondensed stream of the *Baker* patent from condensing in the membrane modules, the stream must be heated. To accomplish this heating, a heater is provided.

It is known that vinyl chloride is easily condensed at room temperature (~25° C; see attached Wikipedia discussion (first paragraph) of vinyl chloride). Thus, it appears that heater 622 of the *Baker* patent must heat the stream 613 to temperatures substantially higher than room temperature.

It is noted that the raw stream 610 enters the compressor at approximately room temperature and a pressure of 25 psia, and is compressed therein to a pressure of 250 psia. The temperature increase caused by the compression of the raw stream is likely not going to be substantially higher than room temperature, and, given the fact that using the compressed stream 612 in a heat exchanger to heat the uncondensed stream 613 will allow the uncondensed stream 613 to be heated to only a fraction of the temperature of the compressed stream 612, it is respectfully submitted that such a configuration will not provide the requisite temperature increase in order to prevent the vinyl chloride from condensing, as is required for the apparatus of the *Baker* patent to properly function.

Thus, since the Office action has not provided sufficient evidence for a reasonable expectation of successfully combining the heat exchanger structure of the *Wachsmuth* patent in place of the heater of the *Baker* patent, a *prima facie* case of obviousness cannot be established with respect to claims 15 and 24.

Accordingly, withdrawal of this rejection is respectfully requested.

As mentioned above, applicant submits that independent claims 15 and 24 are patentable and therefore, claims 16-23 and 25-28, which respectively depend from claims 15 and 24, are also considered to be patentable as containing all of the features of claim 15 or 24, as well as for their respective recited features.

5. Rejection of claims 18, 19, and 27 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 5,755,855 (*Baker et al.*) in view of U.S. patent no. 3,225,517 (*Wachsmuth*) and further in view of U.S. patent no. 4,582,121 (*Casey*)

Reconsideration of this rejection is respectfully requested on the basis that the rejection fails to establish a *prima facie* case of obviousness with respect to claim 15 and 24, from which claims 18, 19, and 27 respectively depend.

The deficiencies of the proposed combination of the *Baker* and *Wachsmuth* patents with respect to claims 15 and 24 are discussed above in detail.

It is respectfully submitted that the *Casey* patent fails to provide for the deficiencies of the *Baker* and *Wachsmuth* patents.

Accordingly, a *prima facie* case of obviousness cannot be established with respect to claims 15 and 24, from which claims 18, 19, and 27 respectively depend, and withdrawal of this rejection is respectfully requested.

Further, with respect to claims 18 and 27, none of the *Baker*, *Wachsmuth*, and *Casey* patents discloses a fluid injected compressor, wherein the injected liquid is separated in a heated slate at the exit of the compressor element by a liquid separator, comprising, during the reheating step, using the heat of the separated liquid to re-heat the gas mixture, or a liquid separator incorporated in a compressed air line located at the exit of the compressor element, said exit being connected to the liquid injection system via a return line, and wherein the heat exchanger is incorporated in said return line, as is respectively required by claims 18 and 27.

While the Office action is correct in stating on page 6 that the working fluid used in a heat pipe is the actual heat transfer medium, the heat transfer medium of a heat pipe cannot be considered to be an injected liquid in the compressor element, which is injected into the gas and later separated out, since the working fluid used in a heat pipe is part of a closed system (col. 2, lines 15-33), and thus, the working fluid used in a heat pipe is not injected into the system and later separated out.

Accordingly, a *prima facie* case of obviousness cannot be established with

respect to claim 18 and withdrawal of this rejection is respectfully requested.

6. Rejection of claim 21 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 5,755,855 (*Baker et al.*) in view of U.S. patent no. 3,225,517 (*Wachsmuth*) and further in view of U.S. patent no. 5,048,548 (*Ramsey, Jr.*)

Reconsideration of this rejection is respectfully requested on the basis that the rejection fails to establish a *prima facie* case of obviousness with respect to claim 15, from which claim 21 depends.

The deficiencies of the proposed combination of the *Baker* and *Wachsmuth* patents with respect to claim 15 are discussed above in detail.

It is respectfully submitted that the *Ramsey* patent fails to provide for the deficiencies of the *Baker* and *Wachsmuth* patents.

Accordingly, a *prima facie* case of obviousness cannot be established with respect to claim 15, from which claim 21 depends, and withdrawal of this rejection is respectfully requested.

7. Rejection of claim 23 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 5,755,855 (*Baker et al.*) in view of U.S. patent no. 3,225,517 (*Wachsmuth*) and further in view of U.S. patent no. 6,085,549 (*Daus et al.*)

Reconsideration of this rejection is respectfully requested on the basis that the rejection fails to establish a *prima facie* case of obviousness with respect to claim 15, from which claim 23 depends.

The deficiencies of the proposed combination of the *Baker* and *Wachsmuth* patents with respect to claim 15 are discussed above in detail.

It is respectfully submitted that the *Daus* patent fails to provide for the deficiencies of the *Baker* and *Wachsmuth* patents.

Accordingly, a *prima facie* case of obviousness cannot be established with respect to claim 15, from which claim 23 depends, and withdrawal of this rejection is respectfully requested.

8. New claims 29 and 30

New claims 29 and 30 respectively depend from claims 18 and 27, and are considered to be patentable by virtue of the patentability of claims 18 and 27 discussed above.

Further, it is respectfully submitted that none of the cited prior art documents disclose the specific by-pass and adjustable valve configuration recited in new claims 29 and 30.

9. Conclusion

As a result of the amendment to the claims, and further in view of the foregoing remarks, it is respectfully submitted that the application is in condition for allowance. Accordingly, it is respectfully requested that every pending claim in the present application be allowed and the application be passed to issue.

Please charge any additional fees required or credit any overpayments in connection with this paper to Deposit Account No. 02-0200.

If any issues remain that may be resolved by a telephone or facsimile communication with the applicant's attorney, the examiner is invited to contact the undersigned at the numbers shown below.

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Respectfully submitted,  
  
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